

Notes on the halobiont genus *Chersodromia* (Diptera: Hybotidae) from Tunisia with the description of a new brachypterous species and notes on brachyptery in empidoidea

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Abstract

A recent collection on a sandy beach in Tunisia revealed the presence of three species of *Chersodromia*. The presence of *Ch. albopilosa* CHVÁLA, 1970 in Tunisia is confirmed. *Ch. nigrosetosa* CHVÁLA, 1970 is recorded for the first time for Tunisia and *Ch. tunisiana* sp. nov., a micropterous species related to *Ch. curtipennis* COLLIN and *neocurtipennis* BESCHOVSKI, is described as new for science. A checklist for *Chersodromia* of North Africa is given. Brachyptery in empidoidea is discussed.

Keywords: Empidoidea, Hybotidae, *Chersodromia*, Tunisia.

Introduction

North Africa with its long sandy beaches and many salt marshes, the so-called sebkahs should be paradise for *Chersodromia*, a genus thriving on salty sandy shores. Only five species are hitherto known from that region, and three of them have been recorded in Tunisia: *Ch. albopilosa* CHVÁLA, 1970, *Ch. oraria* COLLIN, 1966 and *Ch. pseudohirta* CHVÁLA, 1970. The other two species known from the coast of North-Africa are *Ch. amaura* (BECKER, 1902) and *Ch. nigrosetosa* CHVÁLA, 1970. Both are expected to occur in Tunisia as well.

A recent collection during the winter of 2007 on a beach north of Skanes (between Sousse and Monastir) revealed the presence of three *Chersodromia* species. The dominant species is very small and has very short wings not reaching the tip of the second abdominal segment. It is a new micropterous species closely related to the other micropterous species *Ch. curtipennis* COLLIN, 1950 from the Black Sea (Bulgaria, Ukraine, the Crimea) and *Ch. neocurtipennis* BESCHOVSKI, 1974 from the Po delta area on the Adriatic Sea (Lido di Volana, Ferrara, North Italy). Numerous characters are given to separate these three species.

The second species we recorded is *Ch. albopilosa* CHVÁLA, originally described from

Tunis. It has wings that are a little shorter than the abdomen. Finally a single female of *Ch. nigrosetosa* CHVÁLA was found. It is a species with fully developed wings.

CHVÁLA published in 1978 a revision of the Palaearctic *Chersodromia*. His study was achieved and submitted already in 1972, but was only printed in 1978 although the year mentioned on the paper was 1977. Therefore a number of papers published in the lapse of time between the submission of his manuscript and the publication are treated in his 1978 paper only in an addendum and the species are not fully commented. Thus the description of *Ch. neocurtipennis* by BESCHOVSKI (1974) is not given in this excellent review what leads to confusion about its status.

After CHVÁLA's review (1978) several short papers on Mediterranean *Chersodromia* were published containing following species: *Ch. ancilottoi* RAFFONE et al., 1988 from Italy; *Ch. orlandinii* RAFFONE, 1984 from Greece, *Ch. foddaiiae* RAFFONE, 1994 also from Italy. In 1995 PLANT reports five species from the Maltese islands: two are described as new: *Ch. anisopyga* and *Ch. suda*. *Ch. pseudoadriatica* RAFFONE 2004 is the most recent species that was described from Italy.

Not exactly Mediterranean fauna, but interesting to cite is the paper by STARK (1995) on *Ch. tschirnhausi* from Jordan in which he stresses the

halobiont nature of most *Chersodromia* species. We fully agree on that, but this habitat preference does not fit for all Oriental *Chersodromia* since in that region we found several species that occur only in rain forest far away from saline conditions (GROOTAERT et al., 2007).

Material and methods

On 26 December 2007, several tens of small *Chersodromia* were observed running on the sand in sheltered places on the upper beach at Skanes, Monastir, Tunisia. The area of observation was about 20 m from the sea, sheltered by high scrubs (about 3m high) from heavy winds coming from the sea. The air temperature was about 15°C, but higher in the areas sheltered from the wind and exposed to the sun. The *Chersodromia* were running very fast on the sand and jumping from time to time, but never flying. At the time of observation there were very strong winds from the seaside.

About 46 specimens were collected by putting a plastic vial on top of them. Eventually they were submerged in absolute alcohol. All specimens are conserved in the collections of the Royal Belgian Institute of Natural Sciences (Brussels).

Taxonomic account

Chersodromia tunisiana sp. nov.

Figs 1-8, 11

Material examined: Holotype male and paratypes 34 males, 7 females: Tunisia, Monastir, Skanes, beach near Houda, 26 December 2007 (leg. P. Grootaert & I. Van de Velde).

Male:

Body length: 1.26-1.54 mm; wing: 0.28-0.35 mm.

Head. Black in ground-colour. Frons wide, nearly as wide in front as postpedicel is wide. Face above as wide as front of frons, widening below. Jowls below eyes as wide as postpedicel. Ocellar and vertical bristles pale (almost white) with slightly infusate tip. A pair of anterior ocellars crossing; a pair of long posterior ocellars diverging; two pairs of verticals: inner pair longest, erect and crossing; outer pair half as long as inner pair, more adpressed to head and diverging. Postocular pubescence pale and short. Proboscis yellowish. Palp large, elongate, pale (almost white)

with white pubescence. Antenna brownish black. Postpedicel a little longer than wide, almost round with an apico-dorsal style. Basal part of style thickened; style at most twice as long as pedicel and postpedicel combined.

Thorax brownish black in ground-colour, covered with pale (almost white) bristles and hairs. A long erect posthumeral, a short and a long pronotal, a long postalar, acrostichals indistinct, but 3 to 4 pairs present; 2 long dorsocentrals among shorter hairs; a pair of long, crossing apical scutellars. Wing white, very short, reaching halfway abdominal tergite 2. Venation as in Fig. 2. Halter with white stem, but dusky knob.

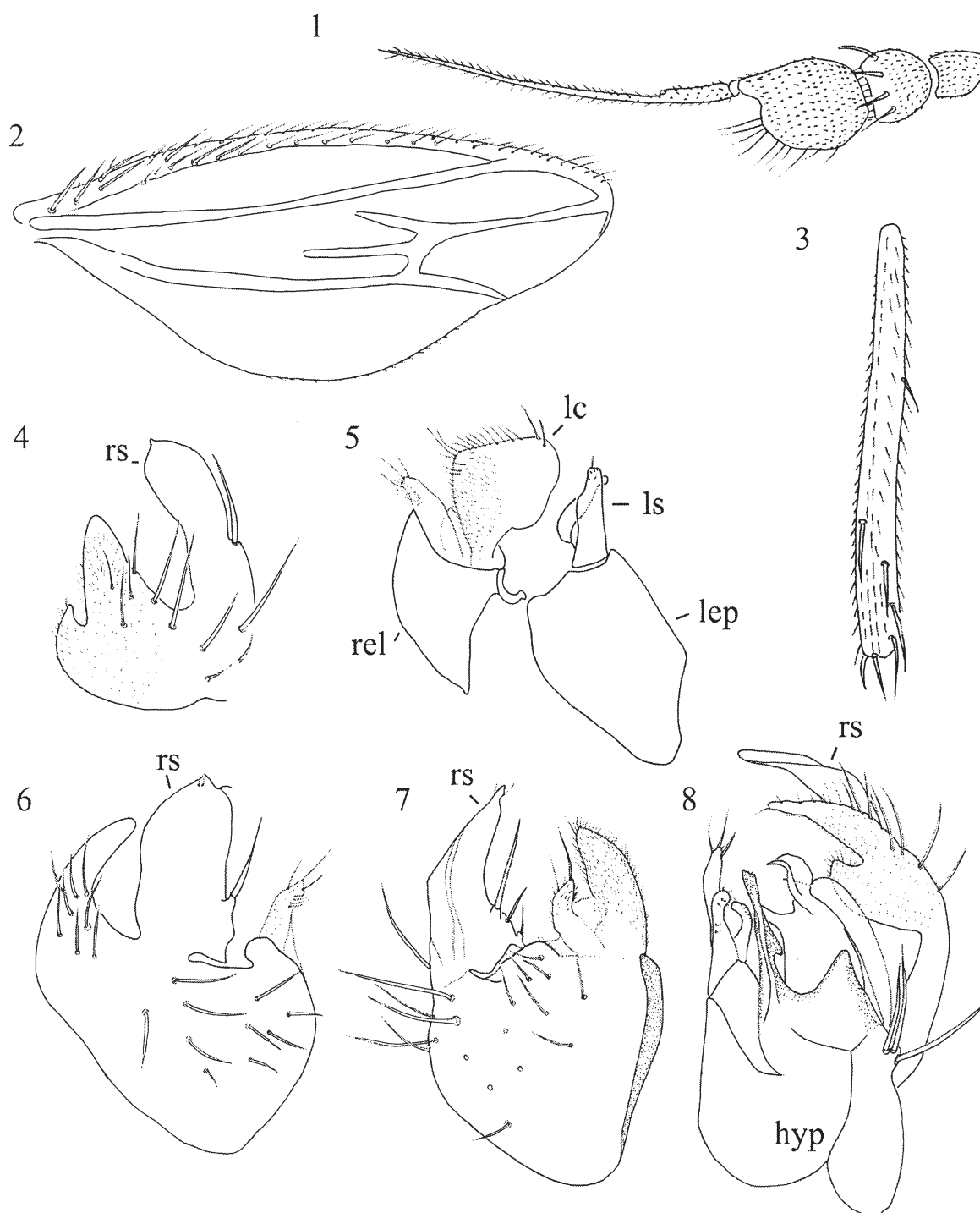
Legs yellow, but mid and hind coxae, fore and mid femora dorsally, and apical tarsomere of all legs brown. There is some variation in the intensity of the darkening of the femora. In some specimens the femora are quite dark. Fore coxa with short pale hairs. Fore femur swollen on basal two thirds; ventrally with a row of short pale bristles about a quarter as long as femur is wide. Fore tibia narrow at base, swollen in apical two thirds; with a pair of black preapical, ventral bristles. Mid femur narrower than fore femur and with a ventral row of black bristles, about one quarter as long as femur is wide at base, becoming slightly shorter towards middle of the femur and becoming pale and indistinct towards tip. Mid tibia with a ventral row of short black bristles in apical third ending in a longer apical spine-like bristle. Hind femur a little wider than mid femur, but still narrower than fore femur, with a short brown anterior preapical and two anteroventral preapicals. Hind tibia with 2 dorsals, 1 anterodorsal and 2 anteroventrals, all as long as tibia is wide (Fig. 3)

Abdomen brownish black in ground-colour and covered with pale almost white hairs including the short marginals. No glandular structures are visible below the tergites. Genitalia as in Figs 4-8. Right epandrial lamella with a bifurcate ventral process (Fig. 4); surstylus fused with right epandrial lamella long and broad, bearing a strong dorsal bristle (Figs 4, 6). Right cercus small, left cercus large with a wide ventral process (Fig. 5). Left epandrial lamella short, bearing two short surstyli.

Female:

Body length: 1.4-1.68 mm; wing: 0.38- 0.42 mm.

In most respects identical to male. Mid tibia without ventral bristles in apical quarter.

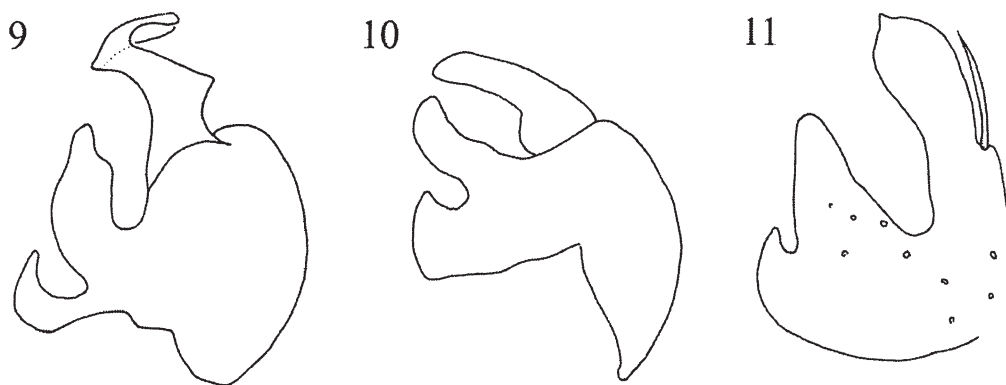


Figs 1-8. *Chersodromia tunisiana* sp. nov. paratype male: 1. Antenna; 2. Wing; 3. Hind tibia; 4. Right epandrial lamella with ventral processes; 5. Right and left cercus and left epandrial lamella with two surstyli; 6. Right epandrial lamella; 7. Right epandrial lamella with cerci; 8. hypandrium. hyp: hypandrium; lc: left cercus; lep: left epandrial lamella; ls: left surstylus; rel: right epandrial lamella; rs: right surstylus.

Discussion

Together with *Ch. curtipennis* COLLIN and *Ch. neocurtipennis* BESCHOVSKI, *Ch. tunisiana* sp. nov. forms a subgroup of closely related

brachypterous species that are included in the *incana*-group of CHVÁLA (1978). The genitalia and the wing have the most obvious characters to separate the species. Unfortunately a microscopic preparation has to be made to see these characters.



Figs 9-11. Right surstylus and bilobed ventral process on right epandrial lamella. 9. *Chersodromia neocurtipennis* Beschovski. 10. *Chersodromia curtipennis* Collin. 11. *Chersodromia tunisiana* sp. nov.

The shape of the bilobed ventral process on the right epandrial lamella is similar in these three species, but typical. As can be seen in Figs. 9-11, the proximal lobe of the ventral process is quite slender in *Ch. neocurtipennis* and shorter in the two other species. The right surstylus is very large and bent in *Ch. neocurtipennis*, but not bent in the two other species. Only *Ch. tunisiana* sp. nov. bears a strong bristle on the inner border of the right surstylus. The tip of the left cercus is large in *Ch. curtipennis* and *tunisiana* sp. nov.; it is pointed (beak-like) in *curtipennis*, large rounded in *Ch. tunisiana* sp. nov. It is not clear how it looks like in *Ch. neocurtipennis*.

The wing venation is also different in the three species. The wings reach the middle of tergite 6 in *Ch. neocurtipennis* while only slightly beyond tergite 2 in *Ch. curtipennis* according to CHVÁLA (1978). In *Ch. tunisiana* sp. nov. they are even shorter and reach only halfway tergite 2. In *Ch. neocurtipennis* the two basal cells are distinctly separated; in *curtipennis* they are fused to a large single cell; in *Ch. tunisiana* sp. nov. no basal cells are distinct since the basal veins disappeared and only the apical parts of veins R4+5 and M are still visible.

The shape of the third antennal segment of *Ch. neocurtipennis* as shown in figure 4 (BESCHOVSKI, 1974) is somewhat misleading. The third segment has only a very short apicodorsal protuberance but the basal part of the second segment of the style is quite thickened (compare Fig. 1).

There remain a few problems and even contradictions in the original descriptions and re-descriptions of the species to be solved. Both *Ch. neocurtipennis* and *tunisiana* sp. nov. have a row of apical ventral spinules in the apical quarter of the mid tibia while *Ch. curtipennis* has only minute

hairs in apical quarter according to BESCHOVSKI (1974), but according to de re-description made by CHVÁLA (1978) a comb of small blackish ventral bristles is present.

Key to the males of the *curtipennis*-subgroup

1. Wing reaching tergite 6. Right surstylus large and bent inward (Fig. 9) (coast of Adriatic Sea) *neocurtipennis* BESCHOVSKI
- Wing reaching only to tergite 2. Right surstylus not bent (Figs 10-11) 2
2. Wing reaching slightly beyond tergite 2. Right surstylus without inner bristle (coast of Black Sea) *curtipennis* COLLIN
- Wing reaching only to middle of tergite 2. Right surstylus with a strong inner bristle (Coast Tunisia) *tunisiana* sp. nov.

Chersodromia albopilosa CHVÁLA, 1970

Material examined: 3 males, 1 female: Tunisia, Monastir, Skanes, beach near Houda, 26 December 2007 (leg. P. Grootaert & I. Van de Velde).

This species is a bit longer than *Ch. tunisiana* sp. nov. The wings are only a little abbreviated and nearly reach the base of the male genitalia. Here we should note that Chvála (1978) only mentions that the wings are small and narrow. All other characters do fit to his description, especially the structure of the male genitalia.

Chersodromia nigrosetosa CHVÁLA, 1970

Material examined: 1 female Tunisia, Monastir, Skanes, beach near Houda, 26 December 2007

(leg. P. Grootaert & I. Van de Velde).

The single female that is identified as *Ch. nigrosetosa* has some differences with the original description of the male. Palp is not yellow, but darkened; the mid and hind femora do not have two preapical bristles, but only one. It is not clear if this is due to sexual dimorphism because Chvála (1978) mentions other differences between male and female: the knob of the halter is darkened in female, but pale in male and the hairs on the tergites, and on the venter are pale in female while dark in male.

This species has a very wide distribution along the Mediterranean Sea from southern Spain, Tunisia, Malta, and Yugoslavia up to Bulgaria along the Black Sea.

Brachyptery in empidoids

Beach flies in general have a number of adaptations to resist heavy winds. Members of the kelp flies Coelopidae have a flattened body that

allows them not only to get inside piles of wrack, but also to avoid to be carried away by the wind. Flies on small islands also have an advantage not to be able to fly since that could lead to get lost in the sea while exploring or be blown away when on the wing. We suppose that the same phenomenon counts for *Chersodromia*. Seashores are often exposed to heavy winds and possessing and using wings reduce survival in these conditions.

Among empidoids the brachyptery (or even aptery) is almost exclusively known within the family Hybotidae (Table 1). The only case found within Empididae is *D. reducta* Smith belonging to the subfamily Hemerodromiinae. It is clear that this feature has no phylogenetic value and was likely to develop as an adaptation to concrete ecological conditions. Within genera *Tachydromia* and *Chersodromia* intermediate species between those with reduced and non-reduced wings are present. In *Stilpon graminum* forms with shortened and normally developed wings can be found.

Table 1. Brachyptery in the families Hybotidae and Empididae.

Taxa	Habitat	References
<i>Hybotidae</i>		
<i>Ocydromiinae</i>		
<i>Ocydromiini</i>		
<i>Apterodromia evansi</i> OLDROYD, 1949	wet forests	OLDROYD, 1949; SINCLAIR, CUMMING, 2000
<i>Apterodromia minuta</i> SINCLAIR, CUMMING, 2000	collected in leaf litter and moss samples	SINCLAIR, CUMMING, 2000
<i>Apterodromia tasmanica</i> SINCLAIR, CUMMING, 2000	collected in litter samples	SINCLAIR, CUMMING, 2000
<i>Apterodromia setosa</i> SINCLAIR, CUMMING, 2000	cool, moist forest	SINCLAIR, CUMMING, 2000
<i>Tachydromiinae</i>		
<i>Tachydromiini</i>		
<i>Tachydromia apterigon</i> Plant, Deeming, 2006	mountains, 1400 m, steep slope, ground layer of stones and organic detritus	PLANT, DEEMING, 2006
<i>Tachydromia brevipennis</i> (VON ROSER, 1840)	leaves of plants along the brook, mountains	CHVÁLA, 1970b, 1975
<i>Tachydromia rossica</i> SHAMSHEV, 1994	lowland, ground layer of organic detritus	SHAMSHEV, 1994
<i>Tachydromia schnitteri</i> STARK, 1996	inland dunes	STARK, 1996
Drapetini		
<i>Ariasella pandellei</i> SÉGUY, 1941	?	SÉGUY, 1941
<i>Ariasella pieltaini</i> GIL, 1936	?	GIL, 1936
<i>Ariasella semiaptera</i> GIL, 1923	?	GIL, 1923
<i>Chersodromia arenaria</i> (HALIDAY, 1833)	coasts with gravel sands	CHVÁLA, 1975, 1978
<i>Chersodromia curtipennis</i> COLLIN, 1950	sea coast	COLLIN, 1950; CHVÁLA, 1978
<i>Chersodromia inchoate</i> (MELANDER, 1906)	hot dry sands above sea beach	MELANDER, 1906
<i>Chersodromia neocurtipennis</i> BESCHOVSKI, 1974	sea coast	BESCHOVSKI, 1974

<i>Chersodromia parallela</i> (MELANDER, 1928)	sandy beach	MELANDER, 1928
<i>Chersodromia tunisiana</i> sp. nov.	sandy beach	
<i>Dusmetina iberica</i> GIL, 1930	?	GIL, 1930
<i>Pieltaia iberica</i> ARIAS, 1919	?	ARIAS, 1919
<i>Stilpon leleupi</i> SMITH, 1969	in forest humus	SMITH, 1969
<i>Stilpon graminum</i> (FALLÉN, 1815)	grass tufts, moss, on soil among old leaves	CHVÁLA, 1975; SHAMSHEV & GROOTAERT, 2005
<i>Stilpon</i> sp.	?	SHAMSHEV & GROOTAERT, 2005
<i>Empididae</i>		
<i>Hemerodromiinae</i>		
<i>Drymodromia reducta</i> SMITH, 1969	?	SMITH, 1969

Checklist of the North African *Chersodromia*

albopilosa CHVÁLA, 1970: Acta ent. bohemoslov., 67: 404 (*Chersodromia*). Type-locality: "Tunis: Hoegen" (Tunisia).

Distr.: Europe: Italy, North Africa: Tunisia.

amaura (BECKER, 1902): Mitt. zool. Mus. Berl., 2(2): 42 (*Halsanalotes*). Type-locality: Alexandria [= Alexandria] (Egypt).

Distr.: Europe: Italy, North Africa: Egypt.

nigrosetosa CHVÁLA, 1970: Acta ent. bohemoslov., 67: 390 (*Chersodromia*). Type-locality: Almeria, Albufera (Spain).

Distr.: Europe: Spain, Malta, Dalmatia, Bulgaria and Ukraine the Crimea; North Africa: Morocco, Tunisia.

oraria COLLIN, 1966: Boll. Mus. civ. Stor. nat. Venezia, 16(1963): 33 (*Chersodromia*). Type-locality: Delta Padáno, Rosolina Mare (Italy).

Distr.: Europe: Spain, Italy; North Africa: Tunisia; Azores.

pseudohirta CHVÁLA, 1970: Acta ent. bohemoslov., 67: 385 (*Chersodromia*). Type-locality: La Marsa near Carthage (Tunisia).

Distr.: Europe: Malta; North Africa: Tunisia; Canary Is.

tunisiana sp. nov. (*Chersodromia*). Type-locality: Skanes, Monastir, Tunisia.

Distr.: North Africa: Tunisia.

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